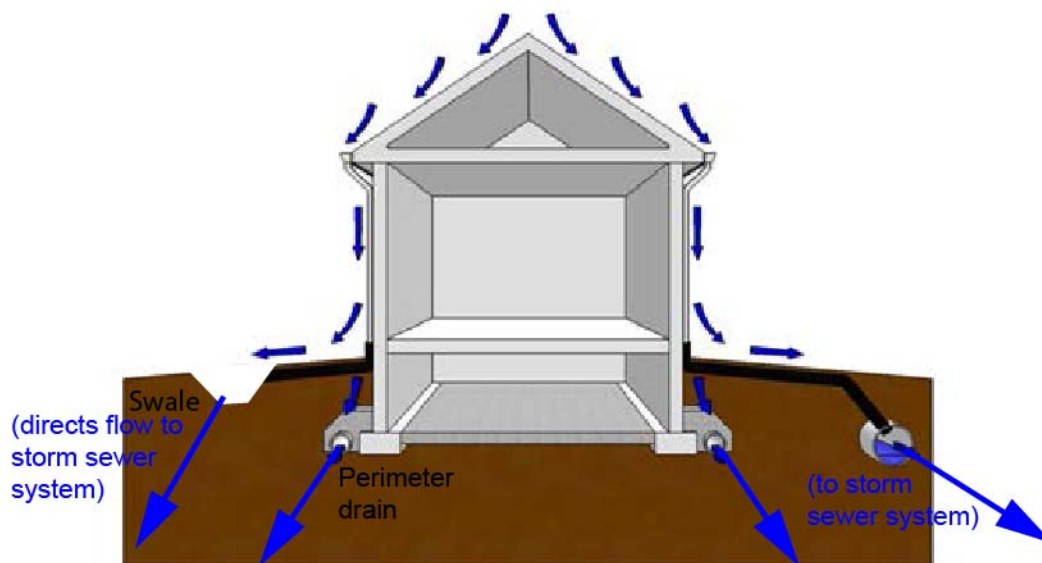


## Picture Story: Encapsulating a GHI Crawl Space December 16, 2014

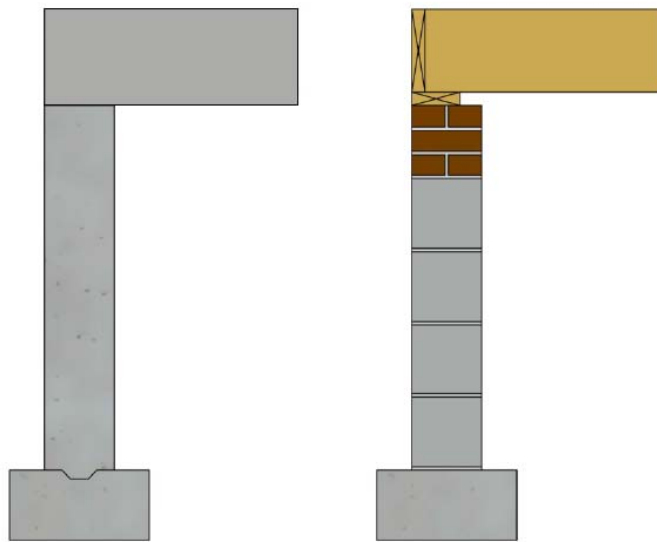
Following images illustrate the encapsulation of a crawl space. Images borrowed and modified from “Guide to Closing and Conditioning Ventilated Crawlspace”, Bruce Dickson, IBACOS, Inc., 2013.

• <http://www.nrel.gov/docs/fy13osti/54859.pdf>

### 1. First lines of defense for mitigating drainage issues for a crawlspace.



**Figure CSTFx. Idealized external moisture control mechanisms for a masonry unit crawlspace.**



Poured Concrete Stemwall  
and floor (Masonry)

CMU with Solid Brick  
Top Course (Frame)

**Figure CSTFx. Types of foundation wall and flooring for primary housing types in GHI. (CMU = concrete block wall with mortar joints)**

## 2. Cartoon representing foundation walls...

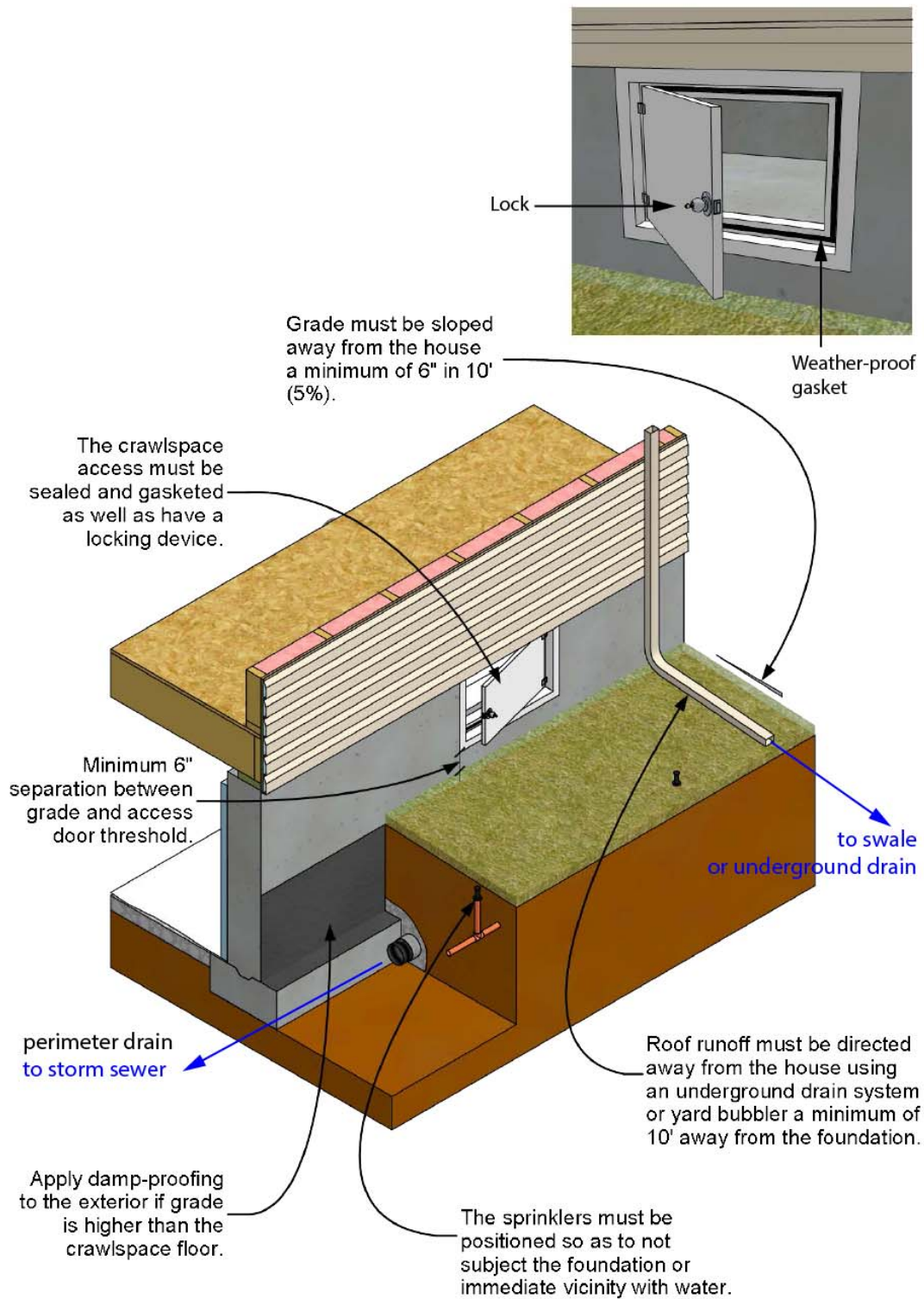
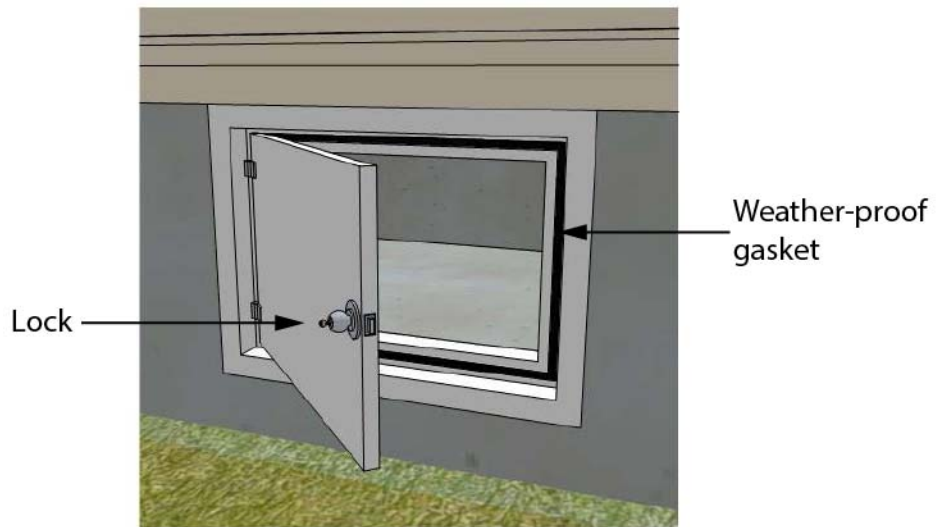
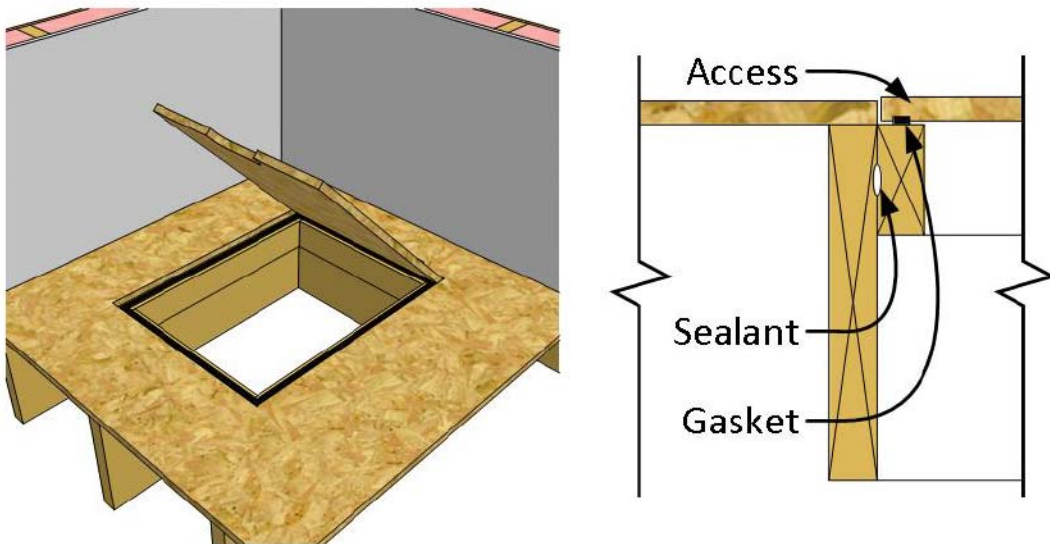


Figure CSTFx. Frame unit crawlspace exterior details

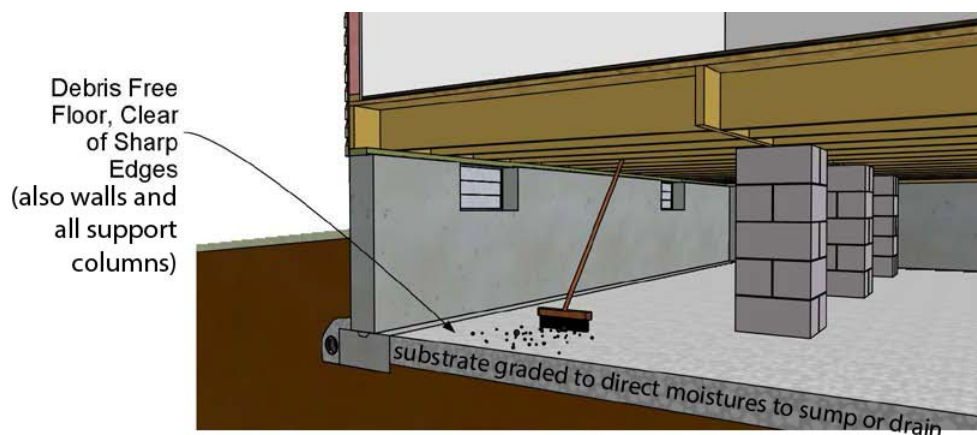


**Figure CSTFx. Idealized exterior access door for a frame unit.**



**Figure CSTFx. Idealized interior access door for an addition.**

### 3. Possible replacement doors...

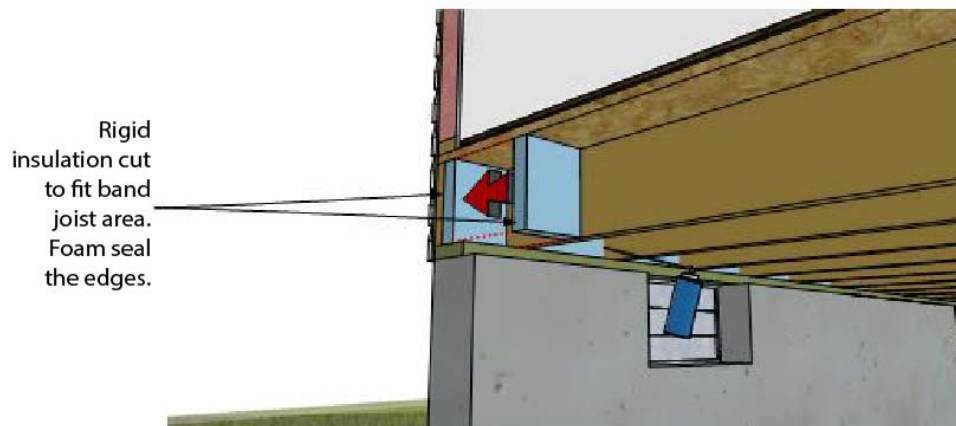


**Figure CSTFx. Crawl space floor and wall preparation to include removal of obstacles to vapor barrier installation, degraded insulation, and grading of substrate .**

4. Remediating Crawl Space...remove steam pipes...remove debris...grade/regrade substrate to drain into sump or passive drain.



**Figure CSTFx. Foam sealant at band joist insulation and penetrations**



**Figure CSTFx. Band joist insulation and air sealing**

## 5. Sealing and Insulating Band Joists with rigid foam...

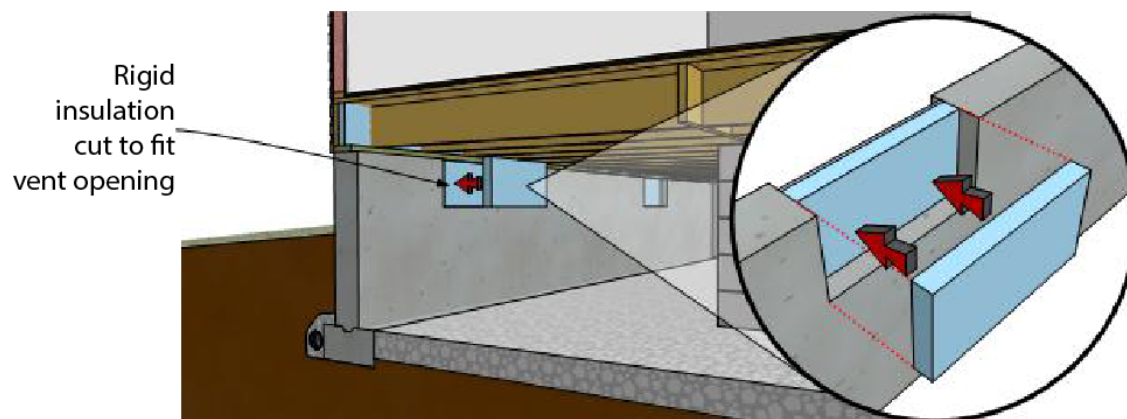


Figure CSTFx. Cut rigid foam inserts to fit over the existing foundation vents

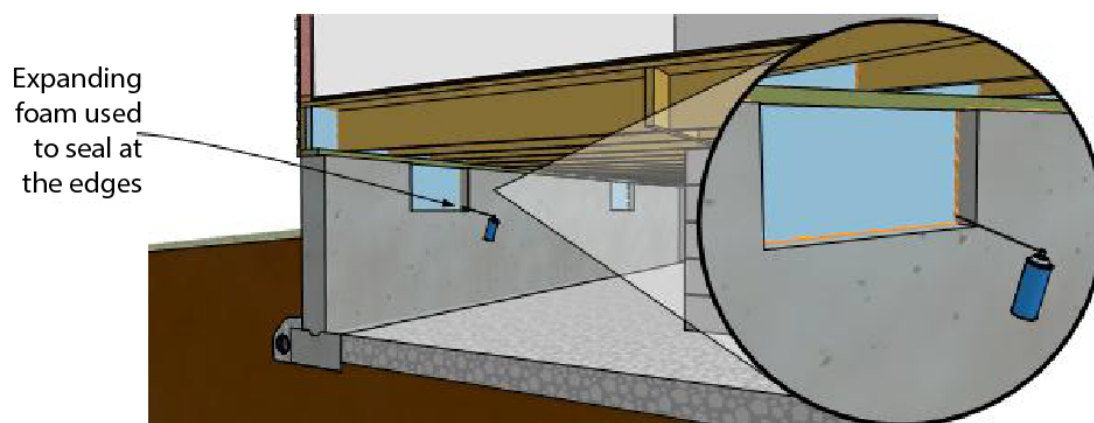
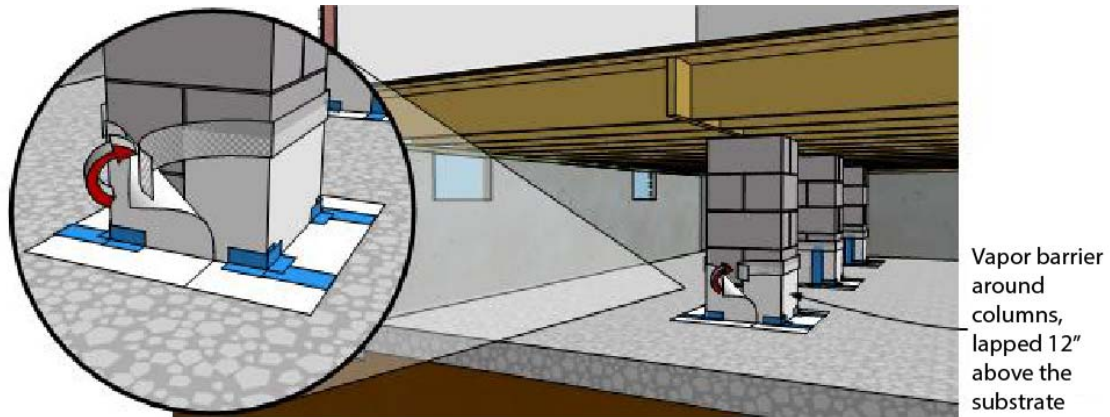


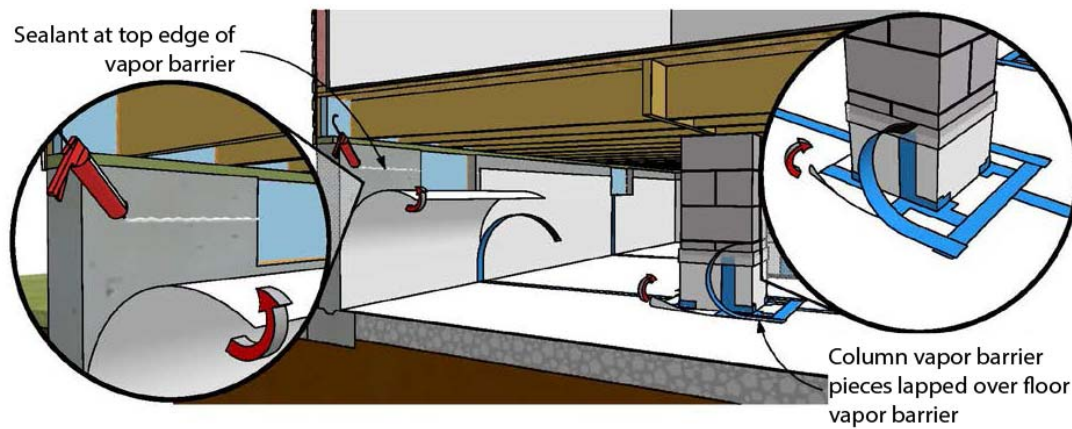
Figure CSTFx. Use spray foam to seal the edges of the foam inserts

## 6. Sealing and insulating vents...





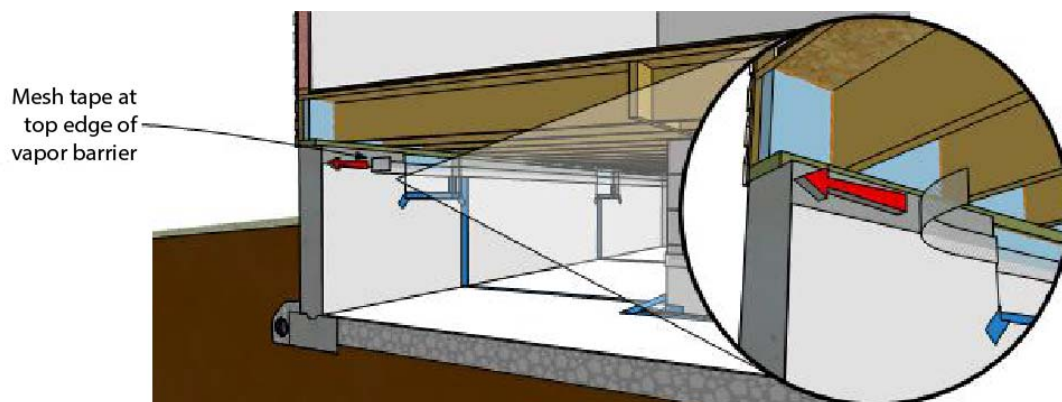
**Figure CSTFx. Lap the vapor barrier and seal the connection to the column.**



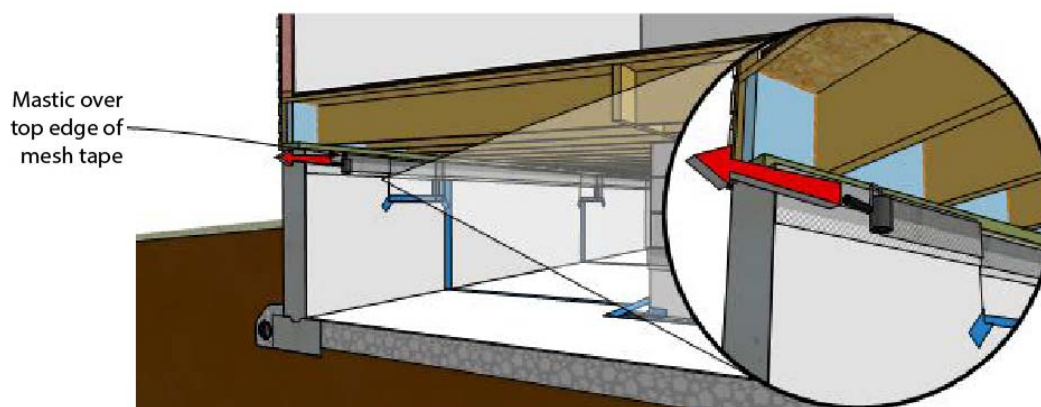
**Figure CSTFx. Apply poly vapor barrier, and lap and seal the seams.**

## 7. Installing vapor barrier to above grade...lap and seal seams.





**Figure CSTFx. Use mesh tape to seal the vapor barrier to the interior surface of the foundation walls 4" below the top of the wall to allow space for pest inspections.**



**Figure CSTFx. Embed the mesh tape with mastic to complete the seal between the vapor barrier and the foundation wall.**

8. Use mesh tape and appropriate mastic to seal vapor barrier to wall.

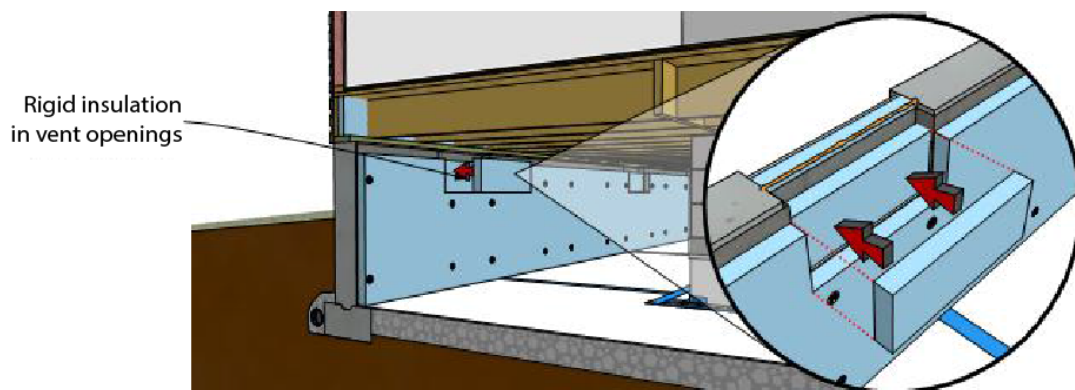


Figure CSTFx. Foundation vent area insulation schematic.

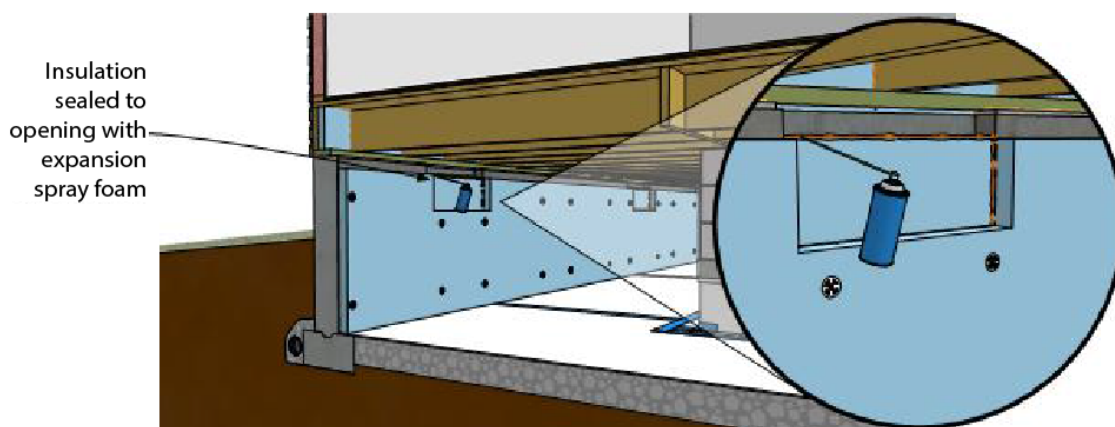


Figure CSTFx. Foundation vent area sealing.

9. Installing rigid foam in vent openings...need to make sure animals do not create holes in foam from outside.

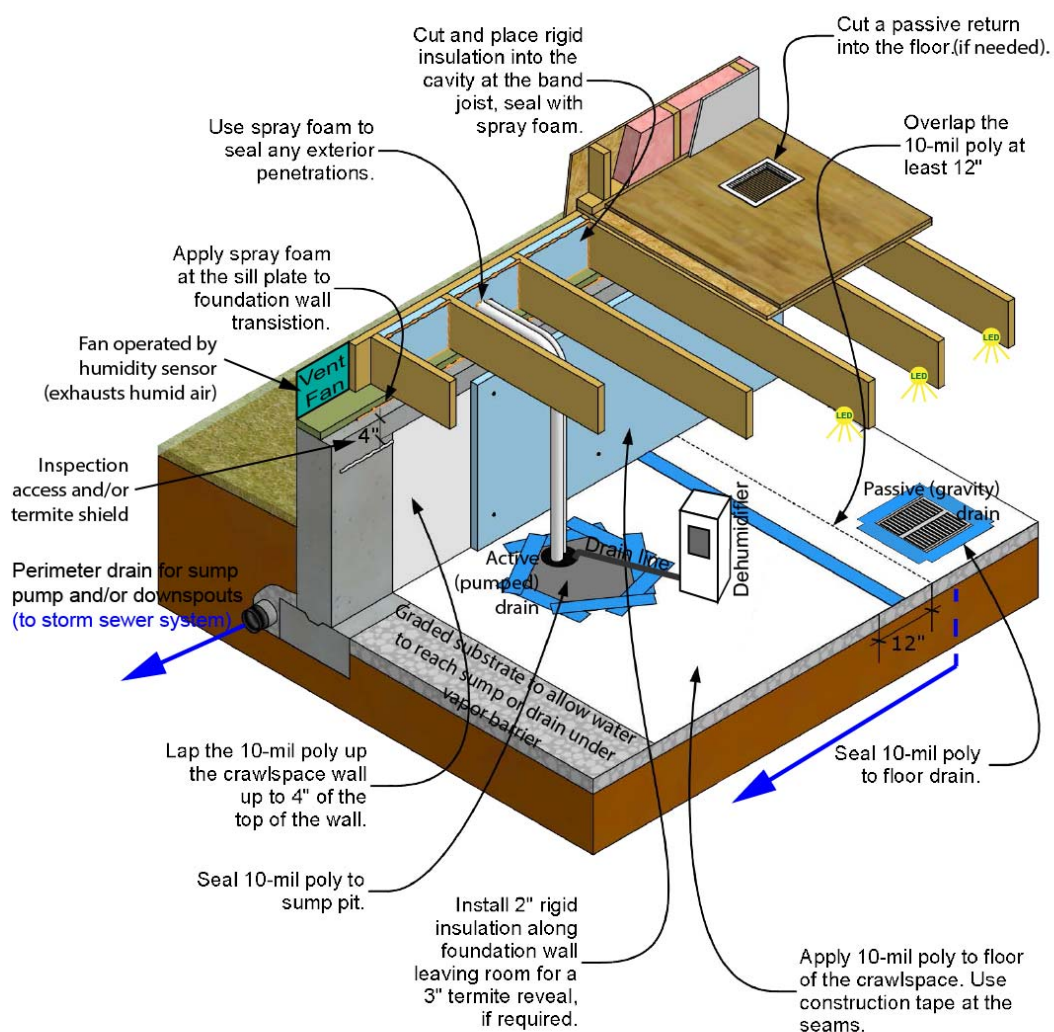


Figure 1 (ES). Crawlspace interior details of idealized NREL frame crawl space adapted for GHI units that includes a sensor-controlled vent fan and dehumidifier and both active (sump pump) and passive (gravity drain) outlets, as appropriate, for water that infiltrates under the vapor barrier. See Figure CSTFx for details of sealed access door.

## 10. Idealized crawl space...missing access corridors.

<http://www.epa.gov/indoorairplus/technical/moisture/images/large/13.jpg>

## 11. Example of Sealed Crawl Space – EPA website.

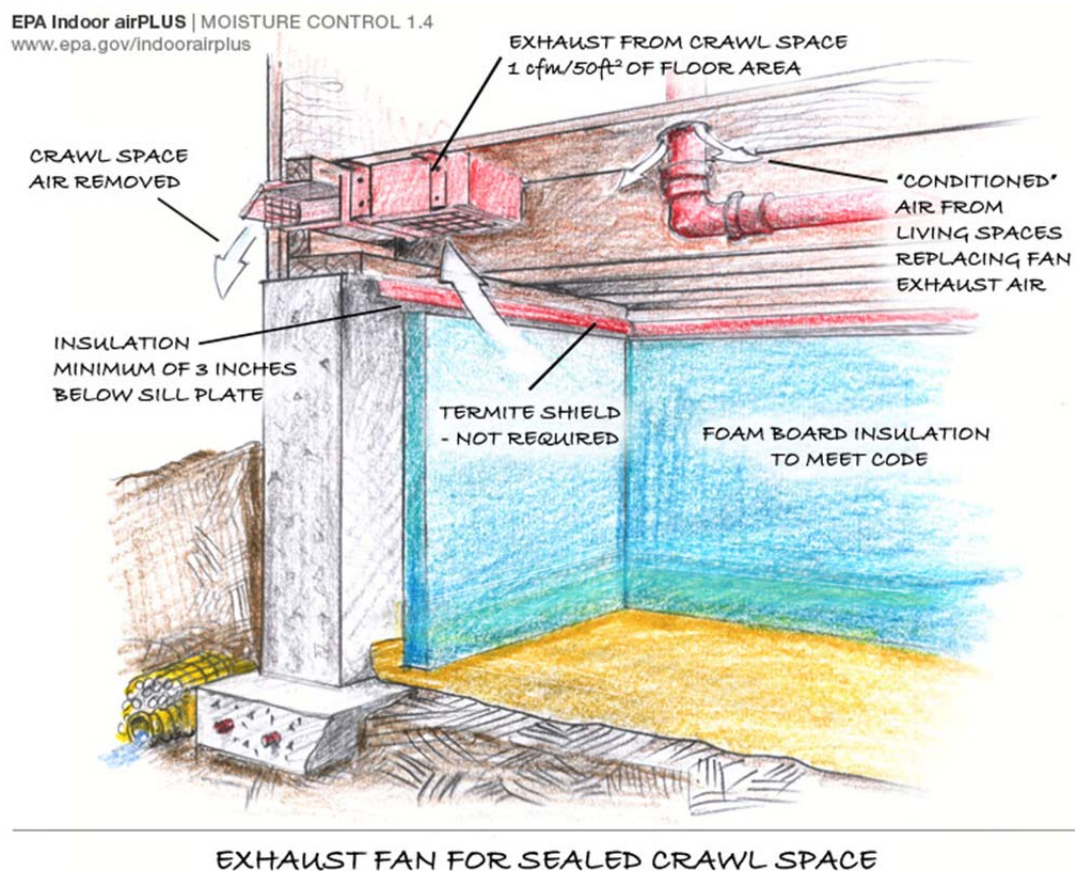




Figure CSTFx. Example of warning sign to be posted at crawlspace entrances.

12. Example of sign to put in crawl space to remind workers to maintain and repair vapor barrier.



## 13. Critical crawl space checklist (NREL Table 1 – adapted for GHI)

IF any mold or wood rot is observed during the initial inspection:	THEN a mold remediation professional will need to conduct an in-depth inspection and proper remediation of the affected area. No work can proceed until the space has been certified clean by the professional. Any rotten wood material must be removed and replaced.
IF foundation walls have cracks or signs of structural problems:	THEN a qualified mason and/or structural engineer will have to make an inspection and do necessary remedial work to repair or strengthen the wall.
IF there are questionable electrical practices or any exposed wiring that poses a safety threat:	THEN a qualified electrician will have to conduct a thorough inspection with the crawlspace and make necessary corrections or replacements to meet current code requirements. LED crawlspace lighting can be installed to aid further work and recurring inspections at this time.
IF recognizable signs of termite or other pest-related activity or damage is observed:	THEN a certified pest-control contractor must inspect and treat the crawl space area before renovation work can proceed. This should include sealing access points in foundation and flooring.
IF standing water is observed anywhere on the crawlspace floor:	THEN the source of the water will have to be determined and eliminated along with removing the standing water. This should include grading the substrate and/or installing drainage pathways so that water will have access to the sump or drain locations.
IF measured radon levels exceed Environmental Protection Agency acceptable levels:	THEN a radon mitigation professional must be contacted to develop an appropriate mitigation strategy to be implemented within the overall crawlspace remediation strategy.
IF past moisture issues have led to excess moisture in wooden framing above the crawlspace:	THEN a dehumidification will be needed to dry the wooden materials must be part of the overall crawlspace remediation strategy.